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EVALUATION OF POST EMERGENCE HERBICIDES ON WEED CONTROL IN RICE NURSERY

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ABSTRACT

A field experiment was conducted during rainy seasons of 2007-08 and 2008-09 to evaluate different post emergence herbicides like cyhalofop butyl 100 g ha^{-1}, bis-pyribac-sodium 20 to 50 g ha^{-1}, propaquizafop 50 g ha^{-1}, ethoxy sulfuron 15 g ha^{-1}, 2,4-D Na salt 800 g ha^{-1}, alone and tank mixture of cyhalofopbutyl 100 g ha^{-1} + ethoxy sulfuron 15 g ha^{-1} 2,4-D Na salt 800g ha^{-1} for broad spectrum weed control in rice nursery. Results revealed that all the herbicidal treatments significantly reduced total weed density and dry weight over unweeded check. Among the treatments, post emergence application of bis-pyribac-sodium 30 g ha^{-1} applied 15 at DAS (days after sowing) significantly reduced total weed density, dry weight and was on par with its higher doses of 40 and 50 g ha^{-1} with weed control efficiency of 74 to 79 percent. Among the treatments, post emergence application of propquizafop 50 g ha^{-1} caused severe stand loss of rice (90 percent) by 14 days after application. Whereas, bis-pyribac-sodium at higher dose of 50 g ha^{-1} also caused slight injury, but crop recovered with in 14 days after application. Tank mixing of cyhalofop butyl 100 g ha^{-1} with 2, 4-D Na salt 800 g ha^{-1} or ethoxy sulfuron 15 g ha^{-1} did not offer any additional advantage compared to bis-pyribac-sodium 30 g ha^{-1}.

Key words: Post emergence herbicides, rice nursery.

INTRODUCTION

In transplanted rice cultivation, maintenance of weed free nursery is a pre requisite, in order to ensure good seedling vigour and ultimate optimum stand in rice and also to reduce early weed competition in main field. In rice nurseries, continuous use of grassy herbicides for the control of problematic weed like *Echinochloa* spp. resulted in weed shift towards broad leaf weeds (BLW) and sedges which became problematic and significantly reduce the crop growth. Though, 2,4,-D is used for control of BLW but it is causing slight injury

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besides poor or no control of grassy weeds. In past, several workers reported about the possible use of pre- and post-emergence grassy herbicides in rice nurseries (Rao and Moody, 1988; Hariom *et al.*, 1993; Narasimha-Reddy *et al.*, 1999; Venkata-raman, 2000; Rao, 2005). But, there is a dire need to evaluate new selective post emergence herbicides for broad spectrum weed control in rice nursery as the information available on this aspect is scanty. Keeping this in view the present investigation was conducted to find out a selective broad spectrum herbicide for control of grasses, sedges and BLW in a single spray in rice nursery as an alternative to the existing recommendation.

MATERIALS AND METHODS

A field experiment was conducted consisting of 12 treatments with three replications using randomized complete block design during rainy season of 2008 and 2009 at Regional Agricultural Research Station, Lam, Guntur, A.P, India. The soil of the experimental plot was clay loam with a pH of 8 and medium in available N and P and high in available potassium. Rice seeds of cultivar 'Samba Mashuri' ('BPT' 5204) at 50 kg ha^{-1} and common weed seeds (grasses and BLW) at 10 kg ha^{-1} were mixed thoroughly and broadcasted uniformly in 2x2 m^2 plots.

The crop and weed seeds were inter mixed with soil in the upper 2 to 3 cm layer. All the recommended cultural practices except weed control were followed for raising the nursery. Post-emergence herbicides were applied on 15 DAS using spray volume of 500 L ha^{-1}. Phytotoxicity rating was made on 7 and 14 days after treatment (DAT). Observations on seedling density, weed density, dry weight of crop and weed were recorded from one quadrate at 30 days after sowing (DAS). The data on weed population was transformed to $\sqrt{x+0.5}$ transformations before statistical analysis and then subjected to ANOVA followed by LSD test for mean separation (Steel *et al.*, 1997).

RESULTS AND DISCUSSIONS

Effect on weeds

The dominant weed flora of the experimental field consisted of grassy weeds such as *Echinochloa colona* and *Dinebra retroflexa*; sedges like *Cyperus rotundus* and broad leaf weeds *Commelina benghalensis, Phyllanthus niruri, Cynotis cucullata, Eclipta alba, Digeria arvensis,* and *Trianthema portulacastrum.* All the weed control treatments significantly reduced the density of grasses, BLW, total weed density and dry weight over unweeded check (Table-1). Among the treatments, post emergence application of bis-pyribac-

sodium 30 g ha^{-1} reduced weed growth with higher weed control efficiency (WCE) of 74 % and was at par with its higher doses of 40 and 50 g ha^{-1} and also with hand weeding at 15 DAS and significantly superior to post emergence application of cyhalofopbutyl 100 g ha^{-1}, propaquizafop 50 g ha^{-1} and 2,4-D Na salt 800 g ha^{-1}.

It was further observed that tank mixing of cyhalofopbutyl with 2,4–D Na salt/ethoxy sulfuron did not offer any additional advantage when compared to alone application of bis-pyribac-sodium. This clearly indicates broad spectrum control by bis-pyribac-sodium. These observations are supported by the previous work of Rao and Moody (1988) who recommended the use of herbicides over the mechanical control of weeds in rice nurseries.

Effect on crop

The visual rating on phytotoxicity of herbicides recorded at 7 and 14 days after application indicated that post emergence application of propaquizafop 50 g ha^{-1} caused severe stand loss of rice at 60 and 90 %, respectively. Whereas bis-pyribac-sodium at higher dose of 50 g ha^{-1} also caused slight injury of pale yellow /topburn etc. But crop recovered by 10 days after application (Table-2). All the herbicide treatments except propaquizafop significantly influenced crop dry weight over unweeded check.

Among the treatments, post emergence application of bis-pyribac-sodium 30 g ha^{-1} recorded higher crop dry weight but was on par with the other doses (20,40, and 50 g ha^{-1}) and also with alone application of cyhalofop butyl, ethoxy sulfuron and their combination. However, none of the herbicides could reach the level of hand weeding, which recorded the highest dry weight of rice seedling at 30 DAS.

These results are corroborated with those reported by Rao (2005) and further supported by the work of Patel *et al.* (1985) and Rao and Moody (1988), who obtained a variable control in rice nurseries with the use of different herbicides.

From this study, it can be concluded that post emergence application of bis-pyribac-sodium 30 g ha^{-1} applied 15 DAS was found to be the most effective due to its effective broad spectrum control, high selectiveness to rice with out any phytotoxicity and higher dry matter accumulation in rice seedlings and lower cost of application compared with hand weeding. The next best treatment is the lower dose of bis-pyribac-sodium 30g ha^{-1} applied 15 DAS.

Table-1. Effect of different treatments on weed density and dry weight in rice nursery (Pooled data).

Treatments	Dose (g ha^{-1})	Time of application (DAS)	Weed density (plants m^{-2}) at 30 DAS				Total weed dry weight (g m^{-2}) at 30 DAS	WCE (%)
			Grasses	Sedges	BLW	Total weeds		
T1- Unweeded check	-	-	9.9 (108.7)	5.6 (30.1)	10.6 (112.0)	15.8 (251.3)	11.7 (140.0)	-
T2- Hand Weeding	-	15	4.4 (20.0)	4.1 (18.0)	4.4 (20.0)	7.6 (58.0)	3.8 (14.5)	68
T3- Cyhalofop butyl	100	15	3.0 (10.0)	5.3 (25.3)	7.3 (54.0)	9.4 (90.0)	5.1 (26.4)	56
T4- Bis-pyribac-sodium	20	15	3.7 (18.0)	4.8 (24.0)	5.4 (30.7)	8.3 (70.7)	3.8 (14.8)	68
T5- Bis-pyribac-sodium	30	15	2.1 (6.00)	4.2 (18.0)	3.2 (12.0)	6.0 (39.3)	3.1 (9.5)	74
T6- Bis-pyribac-sodium	40	15	1.5 (2.7)	3.4 (11.3)	2.9 (8.0)	4.7 (22.0)	2.9 (8.1)	75
T7- Bis-pyribac-sodium	50	15	1.2 (2.0)	3.8 (16.0)	1.8 (4.0)	4.7 (26.0)	2.5 (6.3)	79
T8- Propaquizafop	50	15	4.1 (22.7)	5.4 (31.3)	7.6 (59.7)	10.5 (114.0)	4.6 (16.0)	61
T9- Ethoxysulfuron	15	15	5.8 (33.3)	3.6 (14.0)	3.8 (14.0)	7.8 (61.3)	4.0 (15.5)	66
T10-2,4–D Na salt	800	15	5.4 (30.7)	3.7 (17.3)	0.9 (0.7)	6.7 (46.7)	4.7 (22.6)	60
T11-Cyhalofop butyl + ethoxysulfuron	100+15	15	3.2 (12.0)	3.7 (13.3)	2.5 (3.3)	5.6 (34.0)	4.0 (16.0)	66
T12-Cyhalofop butyl + 2,4–D Na salt	100+800	15	4.1 (17.3)	3.4 (12.0)	2.6 (7.3)	5.8 (34.7)	4.0 (16.0)	66
$CD_{0.05}$			1.68	1.36	1.24	1.35	1.19	

*****DAS Days after sowing. **Data transformed to √x+0.5 transformation. ***Figures in parentheses are original values

Table-2. Effect of different treatments on crop injury, density, plant height and dry weight in rice nursery.

Treatments	Dose (g ha^{-1})	Time of application (DAS*)	Crop injury (%) Days after application		Plant density (plants m^{-2})	Plant Height (cm)	Crop dry weight (g m^{-2})	Cost of Treatment (Rs. ha^{-1})
			7	14				
T1-Unweeded check	-	-			726	20.3	50.0	-
T2-Hand Weeding	-	15			920	26.7	105.7	2,500
T3-Cyhalofopbutyl	100	15			803	25.4	70.3	1,600
T4-Bis-pyribac-sodium	20	15			1028	24.7	75.0	1,200
T5-Bis-pyribac-sodium	30	15			830	23.0	80.0	1,800
T6-Bis-pyribac-sodium	40	15			1011	22.7	72.5	2,400
T7-Bis-pyribac-sodium	50	15	10	0	992	21.1	69.3	3,000
T8-Propaquizafop	50	15	60	90	240	16.3	19.5	1,600
T9-Ethoxysulfuron	15	15			888	25.4	70.2	500
T10-2,4–D Na salt	800	15			861	21.0	65.0	220
T11-Cyhalofop butyl + Ethoxysulfuron	100+15	15			863	24.0	68.0	2,100
T12-Cyhalofop butyl + 2,4-D Na salt	100+800	15	10	0	834	22.2	65.3	1,820
$CD_{0.05}$					144.5	2.98	13.51	

REFERENCES CITED

Hariom, O., P. Singh, R.K. Joon and V.M. Bhan 1993. Weed management in rice nursery. Indian J. Weed Sci. 25 (3&5):14-17.

Narasimha-Reddy, C., M.D. Reddy and M. Padmavathi. 1999. Evaluation of pretilachlor + satcher (Sofit 30% EC) for control of weeds in paddy nursery. Indian J. Weed Sci. 31 (3&4):248-249.

Patel, C.L., Z.G. Patel, R.B. Patel and H.R. Patel. 1985. Herbicides for weed control in rice nurseries, p. 26.

Rao, A.N. and K. Moody. 1988. Weed control in rice seedling nurseries. Crop Prot. 7(3):202-206.

Rao, A.S. 2005. Effect of pre & post emergence herbicides on *Echinochloa* spp. Control on rice nursery. Absts. First International weed seminar, Organized by WBWSS & BCKV at Kolkata, India, Jan. 21-24, pp. 8.

Steel, R.G.D., J.H. Torrie and D.A. Dickey. 1997. Principles and Procedures of Statistics. A Biometrical Approach 3rd ed. McGraw Hill Book Co., Inc., Singapore, pp. 172-177.

Venkata-raman, V., S.M. Krishna, R. Rajendra and S. Ramanathan. 2000. Bio-efficacy of pretilachlor on weed control in rice nursery. Abstracts National Seminar on the sustainable of weed control of weed control options for new millennium. Annanamalai University, Annamalainagar, T.N, India, Dec.20-21, pp. 25.